Name: Date: Period:

**Biochemistry: WebQuest**

**Part 1: Why do Atoms React?**

Go to **http://www.tvdsb.on.ca/westmin/science/sbioac/biochem/react.htm**

**Read the text & view the graphics to answer the following questions**

1. What makes an atom unstable (reactive)

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2. Why do atoms react with other atoms?

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3. What does the Flourine atom do to become stable (unreactive)?

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4. What does the Lithium atom do to become stable (unreactive)?

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**Part 2: Chemical Bonds**

Go to **http://www2.nl.edu/jste/bonds.htm**

**Read the first paragraph & answer the following questions**

1. What is an ion? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. What type of bonds do oppositely charged ions form?

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3. A sodium ion is different than a sodium atom. It has a positive charge. How many protons and electrons does a sodium ion have?

Number of protons \_\_\_\_\_\_\_\_\_, Number of electrons \_\_\_\_\_\_\_\_\_\_\_.

How about a chlorine ion? Number of protons \_\_\_\_\_\_\_, Number of electrons \_\_\_\_\_\_\_\_\_.

3. What type of bonds form when elements share electrons?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. Name a much weaker but important bond in living things \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Ionic bonds- read the text and view the animation**

5. Summarize what happens to form ions and what attracts the ions to form an ionic bond.

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**Covalent bonds – read the text and view the animation.**

6. Summarize what happens to form a covalent bond

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7. Covalent bonds can be polar or non-polar. Click on the links and see if you can describe the difference between a non-polar and polar covalent bond.

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**Hydrogen bonds**

8. Summarize, as best you can, what a hydrogen bond involves.

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9. Name one type of molecule that forms hydrogen bonds with each other?

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**Part 3: Hydrogen Bonding Animation**

Go to **http://www.stolaf.edu/people/giannini/flashanimat/water/water.swf**

**Step through the animation.**

1. Rewrite your summary of hydrogen bonding from above with something new you learned from the animation.

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**Part 4: The Chemistry of Life**

**Go to http://www.biocab.org/Biology.html - anchor\_13156**

**Read the chemistry of life section. You may have to scroll up or down a bit to reach it!**

1. How many naturally occurring elements are there?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. About how many of these elements are found in living matter?

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3. Which 4 are present in 97% of the molecules of living matter?

1) \_\_\_\_\_\_, 2) \_\_\_\_\_\_\_\_, 3) \_\_\_\_\_\_\_\_, 4) \_\_\_\_\_\_

4. What are the main elements in the remaining 3%?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5. Define an organic molecule.

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6. Name the 4 main organic molecules?

1) \_\_\_\_\_\_\_\_\_\_\_\_, 2) \_\_\_\_\_\_\_\_\_\_\_\_\_, 3) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 4) \_\_\_\_\_\_\_\_\_\_\_\_\_

**Part 5: Organic Molecules lab**

Go to **http://www.okc.cc.ok.us/biologylabs/Documents/Organic Compounds/Organic Compounds.htm**

**Click on Carbohydrates**

Look at the example of a carbohydrate; a monosaccharide (simple sugar).

1. What 3 elements make up this molecule? 1)\_\_\_\_\_\_\_ 2)\_\_\_\_\_\_\_\_\_ 3)\_\_\_\_\_\_\_\_\_\_

2. Count the number of hydrogen and oxygen atoms. What is the ratio of H to O atoms?

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**Do the experiment**

3.Which color is the positive test for a **simple sugar (a carbohydrate)** when heated with

Benedict’s reagent? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. Which color is the positive test for **starch (a larger carbohydrate)?**

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**Click on continue or on organic molecules. Then click on Proteins.**

5. Observe the portion of the protein molecule. What are the main elements (R is not an element, it represents a side chain!)?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Do the experiment.**

6. What is a positive test for protein using biuret reagent?

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**Click on continue or on organic molecules. Then click on Fats (lipids).**

7. Observe the fat (lipid) molecule. What elements make up this molecule? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

8. Is the ratio of Hydrogen atoms to Oxygen atoms the same as in the carbohydrate? Yes or No

**Do the experiment.**

9. What color appeared when vegetable oil fat (lipid) was mixed with the Sudan IV?

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**Click on continue. Then click on Foods.**

10. Test the salmon – circle the correct answer

Simple Sugar – **yes or no**, Starch – **yes or no**, Protein – **yes or no**, Fat – **yes or no**

11. Test the milk – circle the correct answer

Simple Sugar – **yes or no**, Starch – **yes or no**, Protein – **yes or no**, Fat – **yes or no**

**Part 6: Protein Structure Animation**

Go to **http://www.stolaf.edu/people/giannini/flashanimat/proteins/protein structure.swf**

This animation represents a protein molecule. View the animation and answer the questions

1. A protein is made up of a chain of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

2. After viewing the animation do you think the shape of a protein molecule is complex? Yes or No

3. Which of the following occurs to form a protein? (circle the correct answer)

A) forms a chain of amino acids B) forms a spiral (helix)

C) folds on itself (bends) D) More than one chain joins together E) all of these

**Part 7: Enzymes**

Go to **http://science.howstuffworks.com/cell2.htm**

Read the text and answer the following questions

1. What is the purpose of enzymes?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. What type of organic molecules (carbohydrate, lipid, protein, nucleic acid) are most enzymes?

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3. What does the shape of an enzyme have to do with how well the enzyme works?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Scroll down to the pink graphic.**

4. What is the function of the active site on the enzyme?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5. In this example the **maltase** enzyme is speeding up what reaction? – Fill in the answers!

The breakup of \_\_\_\_\_\_\_\_\_\_\_\_\_ into two \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ molecules. The Maltose (a sugar)

lands on the \_\_\_\_\_\_\_\_\_\_\_\_\_ site of the enzyme. The enzyme has to have a specific \_\_\_\_\_\_\_\_\_ in order for the maltose to connect there.

**Part 8: Acids & Bases**

Go to **http://lrs.ed.uiuc.edu/students/erlinger/water/background/ph.html**

**View the first two sections of the page & answer the following questions**

1. What subatomic particle(s)is a Hydrogen Ion (H+) made of

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. What is an acid?

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3. What is a base?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Part 9: The pH Scale**

Go to **http://staff.jccc.net/pdecell/chemistry/phscale.html**

**View the page & answer the questions**

1. Since atoms have charge and molecules are made of bonded atoms in a specific shape what can a high concentration of positive Hydrogen ions (H+) do to the shape of a molecule?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. Can changing their shape change their function (what they do)?

Give an example from what you learned about enzymes and their active site. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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3. What does the pH scale measure?

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4. A low pH corresponds to a **high** or **low** hydrogen ion (H+) concentration? Circle the correct answer.

5. A high pH corresponds to a **high** or **low** hydrogen (H+) concentration? Circle the correct answer.

6. What substance has a neutral pH of 7? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

7. What is the pH of saliva? \_\_\_\_\_\_\_\_\_\_\_ Is that slightly acidic or basic?

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8. What is the pH of the acid secreted by your stomach lining? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

9. What is the pH of soapy water? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

10 Is soapy water a base or an acid? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_